



Module 9
Common fault areas in separating walls

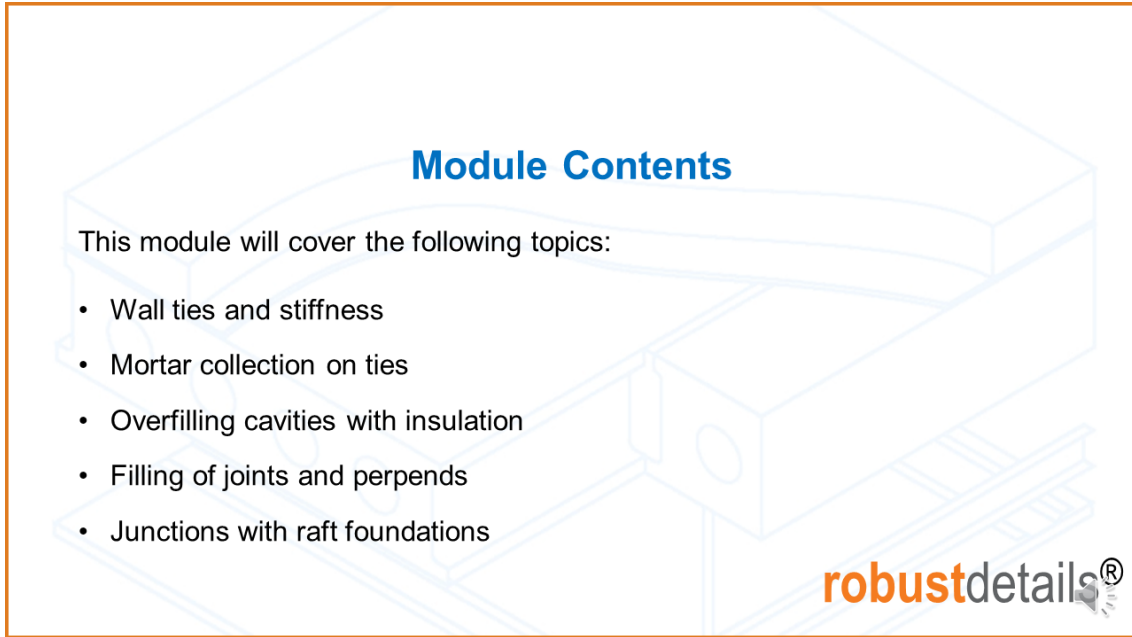


Welcome to Module 9 – Common fault areas in separating walls

Additional notes:

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Slide 2



Module Contents

This module will cover the following topics:

- Wall ties and stiffness
- Mortar collection on ties
- Overfilling cavities with insulation
- Filling of joints and perpend
- Junctions with raft foundations

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This Module will cover the following topics

Read slide

Additional notes:

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Slide 3



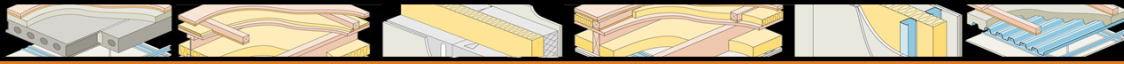
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Additional notes:

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Slide 4

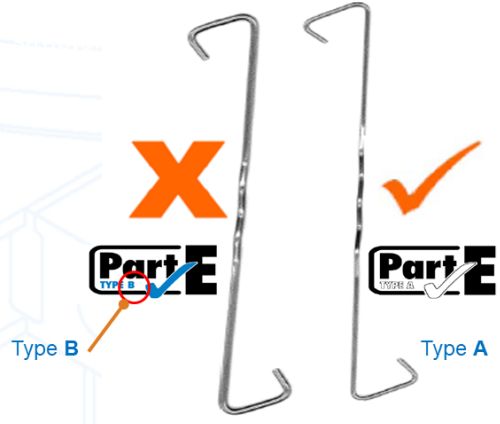
Wall ties and stiffness



As the name suggests, these tie the wall leaves...
structurally and acoustically.

Factors:

- Inherent stiffness of the tie
- Cavity width
- Number of ties



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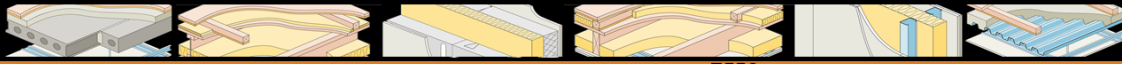
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As the name suggests, these tie the wall leaves
How rigidly they tie them together is dependent on 3 factors

Inherent stiffness – as we can see here, these two look identical, but put side-by-side, we can clearly see one is thicker and hence, stiffer than the other
Cavity width and number of ties

Additional notes:

Wall ties and stiffness

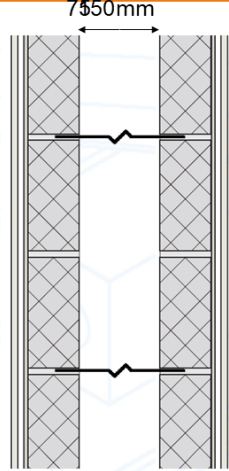


Dynamic Stiffness:

Factors:

- Inherent stiffness of the tie
- Cavity width

1.7 MN/m over 150mm



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A term often banded about is Dynamic Stiffness.
In simple terms, this is a laboratory measure of how much vibration is transferred from one end to the other.

It is dependent on:

The inherent stiffness of the tie; and the cavity width.

So the dynamic stiffness value is always quoted with a specified cavity width.

A typical value would be 1.7 MN/m over a 150mm cavity

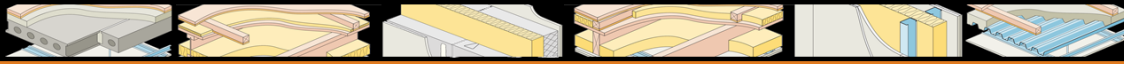
But if these ties were used in a smaller cavity, the stiffness increases significantly

Additional notes:

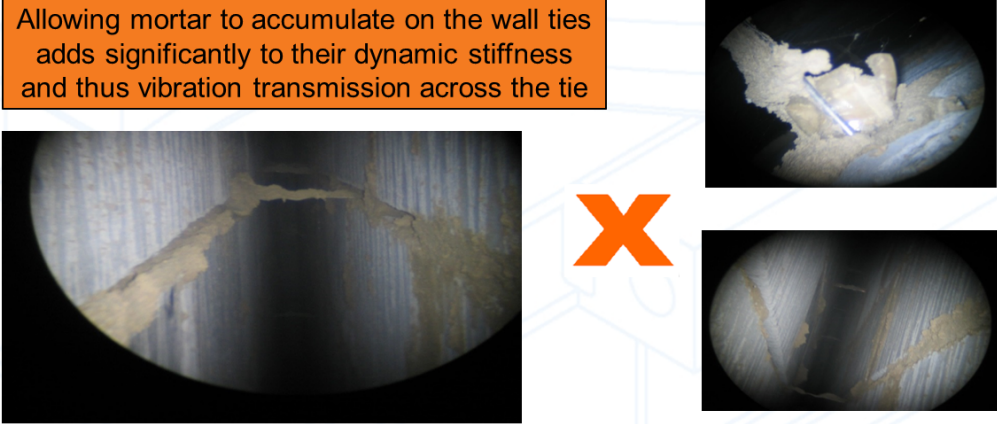
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Slide 6

Wall ties and stiffness



Allowing mortar to accumulate on the wall ties adds significantly to their dynamic stiffness and thus vibration transmission across the tie



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Also, the wall ties need to be kept clear of mortar droppings.

If mortar is allowed to accumulate, this will significantly stiffen the wall tie, and so increases the amount of sound transmitted.

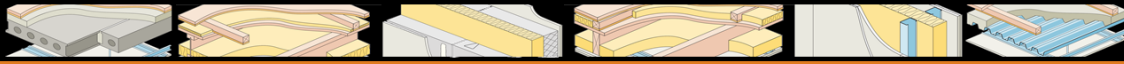
This is particularly prevalent where blown cavity fill is used, as mortar droppings from the whole height of the wall can collect on the lower ties.

Additional notes:

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Wall ties & mortar collection on lower floors

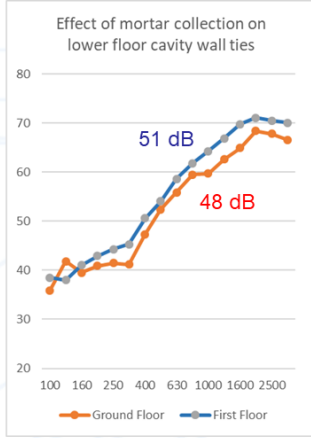


Mortar collection (lower floor cavity wall ties)

The graph on the right shows the airborne sound insulation performance for two separating walls

This is the same separating wall, between same attached houses, with same room volumes but measured on ground floor and first floor.

Due to **mortar collection on the ground floor wall ties** the overall sound insulation performance is 3dB lower than the first floor (which has less mortar on the wall ties)



Frequency (Hz)	Ground Floor (dB)	First Floor (dB)
100	38	41
160	40	43
250	41	44
400	42	45
630	51	54
1000	58	61
1600	65	68
2500	68	71

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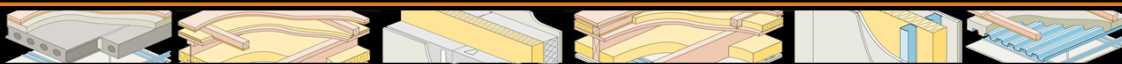
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Lets now look at how mortar impacts stiffness using the standard Graphs

Read Slide

Additional notes:

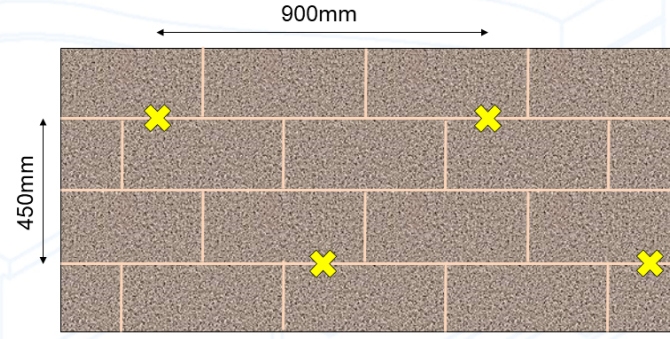
Wall ties and stiffness



Density of connections:

Factors:

- Number of ties

$$\frac{1}{0.9 \times 0.45} = 2.5/m^2$$


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The final part of the equation is the number of connections – or number of ties.

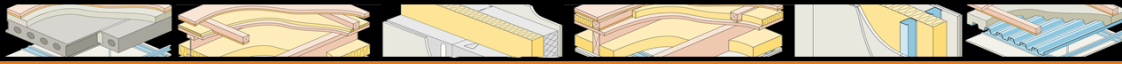
As we all know, the standard spacing for the ties is 900mm horizontally, and 450 vertically

Doing the calculation, this results in a density of 2.5/m²

Additional notes:

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Wall ties and stiffness



Type A connection

Factors:

- Dynamic stiffness measured across a stated cavity width – in **MN/m**
- Density of wall ties – in **m²**

Multiplying these together must result in a value **< 4.8 MN/m³**

$1.7 \text{ MN/m} \times 2.5/\text{m}^2 = \mathbf{4.25 \text{ MN/m}^3}$

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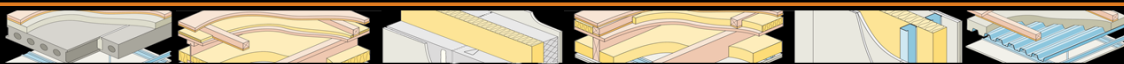
So this brings us back to the question of how rigidly are the 2 leafs connected?
And more importantly, is it Type A ?

In ADE, it states that when we multiply the dynamic stiffness by the density, it must give a connection value less than 4.8
so the typical Dynamic stiffness of 1.7 MN/m – multiplied by 2.5 gives 4.25

So what could go wrong??

Additional notes:

Wall ties and stiffness

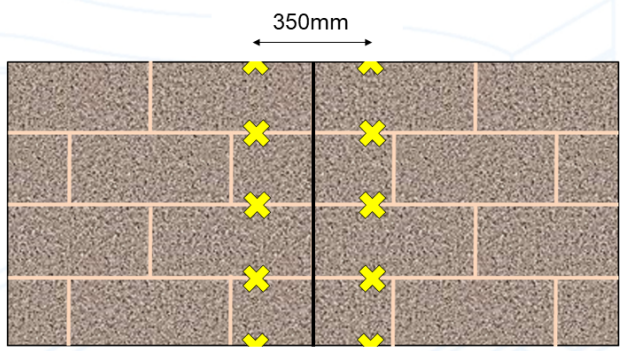


Type A connection ?

Movement Joints:

- Ties within 225mm of the joint and max 300mm vertically


$$\frac{1}{0.35 \times 0.225} = 12.7/m^2$$



350mm

$$1.7 \text{ MN/m} \times 12.7/m^2 = \mathbf{21.6 \text{ MN/m}^3}$$

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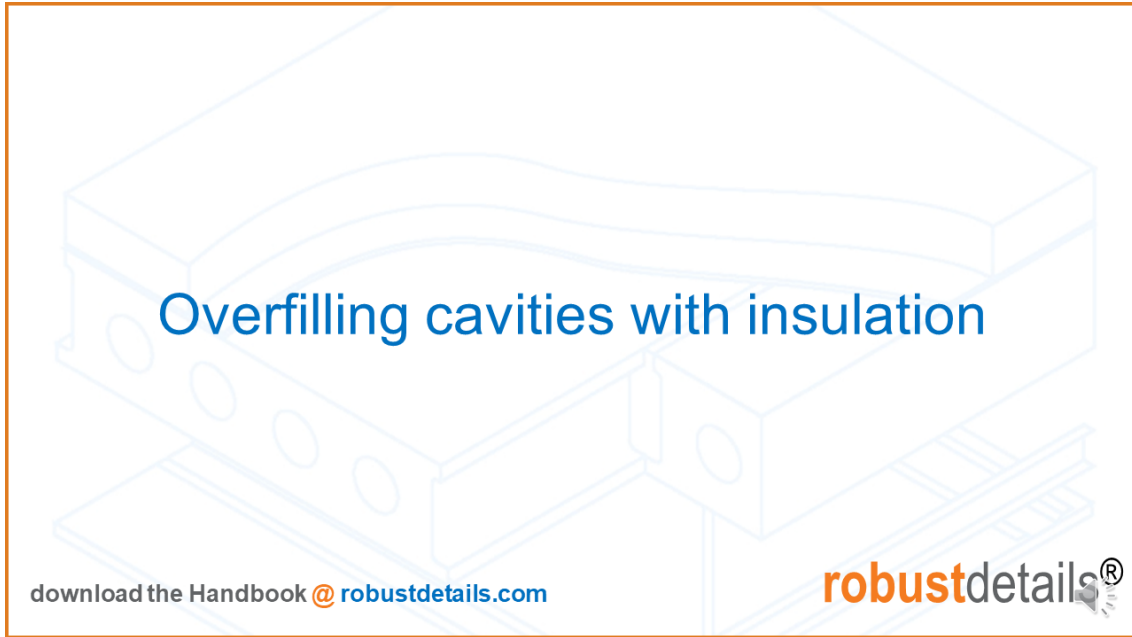
Structural standards say if a wall straight and unbroken and over 6m long, a movement joint is required
And the tie spacing should be... as slide.

225mm from the joint will hit a perp, so we'll say a spacing of 350mm x 225 to give a density of...12.7 ties/m²
Using our average Type A tie gives a connection of...21.6 – over 4 times the 4.8 target
Then a metre down the wall, this repeats for the joint in the other leaf.

Using bed joint reinforcement and slip ties can mitigate the need for, and the effect of having movement joints.

Additional notes:

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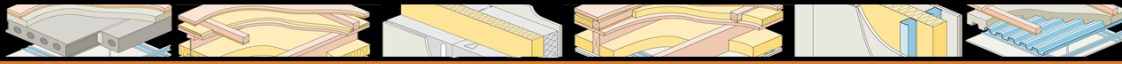


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Additional notes:

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Cavity insulation



Insulation can be added to the central cavity

Ensure it is not too dense or over-compressed

Separating wall cavity insulation (optional)

The cavity may be insulated with mineral wool rolls or batts with a density of 18 – 40 kg/m³. Ensure insulation thickness is no greater than 10mm wider than cavity width to avoid excessive compression of the insulation.

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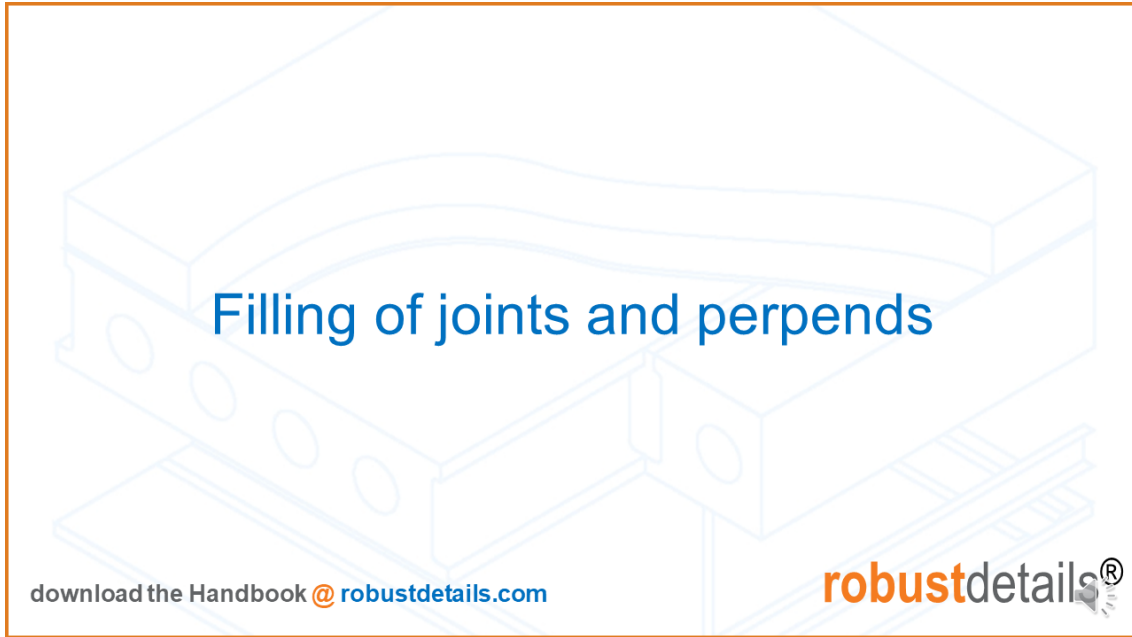
If needed for Part L, insulation can be added to fully-fill the wall. This does not improve acoustic performance, as the work is already done by the insulation within the frames.

However, if the insulation is too dense or if it's over-compressed, it can form an acoustic bridge across the cavity, which can then reduce the acoustic performance.

Additional notes:

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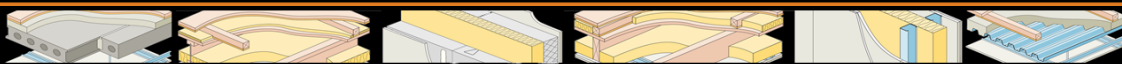


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Additional notes:


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Joints and perpend



Joists and Beams: Can be built in...

- Mortar joints around each joist perimeter are recessed.
- Joint is carefully pointed with silicone sealant.
- Alternatively, proprietary joist caps/ends designed to satisfy the air leakage requirements of Approved Document L1 may be used.



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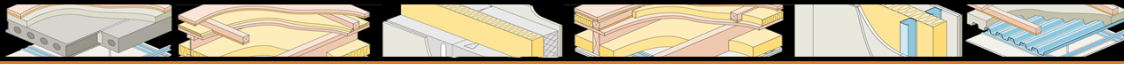
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As shown in Appendix A1, it is possible to build joists into **cavity** masonry walls – but to ensure they don't create a flanking path through the wall... as slide There is a really good animation on our website that shows the process. This shows I-Joists, but it also applies to solid joists; and Metal web joists, provided they have blocked ends. Alternatively, joist end caps that give a good air-tightness can also be used.

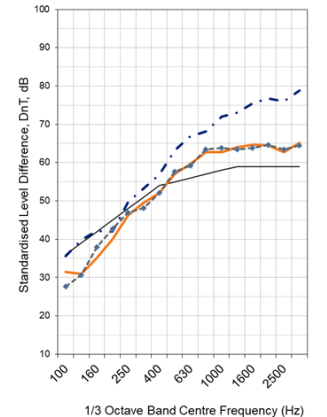


Additional notes:

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Joints and perpend



Joists and Beams: Can be built in...



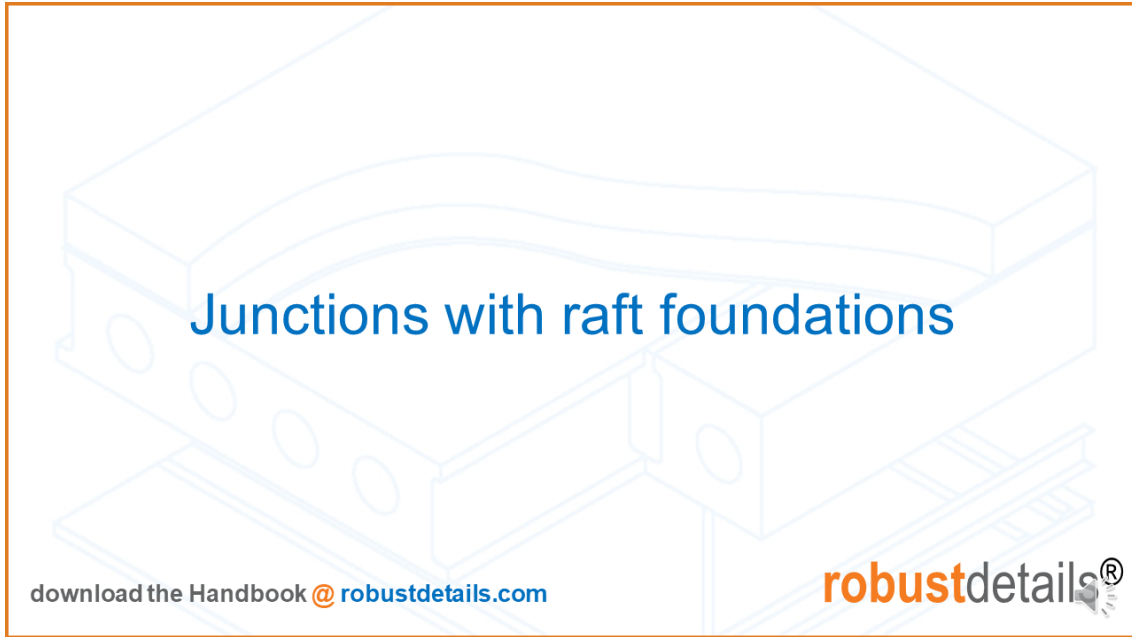
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Most builders are very able and willing to do this...
Others not so.

Where gaps are left, high frequency noise can creep through – as we can see when this scenario is tested... there is a marked drop off at the top of the frequency range compared to a wall that's finished correctly.

Additional notes:

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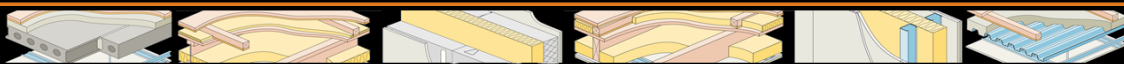


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Additional notes:

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Raft foundations



Can apply equally to transfer decks/podium slabs

Introduction


Table 6a – Robust Detail separating walls which can be used together with the specific flanking constructions contained in Appendix A2

	BRIDGESTOP® system	Smartroof system	Wall Cap RDA2	RoofSpace I-Roof	Space4 system	Donaldson Timber Single Leaf Spandrel	NTSROOF RAPID FIT SYSTEM
Masonry walls	E-WM-1	✓	✓	✓	✓	✓	✓
	E-WM-2	✓	✓	✓	✓	✓	✓
	E-WM-3	✓	✓	✓	✓	✓	✓
	E-WM-4	✓	✓	✓	✓	✓	✓
	E-WM-5	✓	✓	✓	✓	✓	✓
	E-WM-6	✓	✓	✓	✓	✓	✓
	E-WM-8	✓	✓	✓	✓	✓	✓
	E-WM-9						
	E-WM-10	✓	✓	✓	✓	✓	✓
	E-WM-11	✓	✓	✓	✓	✓	✓
	E-WM-12	✓	✓	✓	✓	✓	✓
	E-WM-13	✓	✓	✓	✓	✓	✓

directly off slab if dissimilar materials (steel or timber frame)

any masonry walls must include BRIDGESTOP® (Appendix A2)

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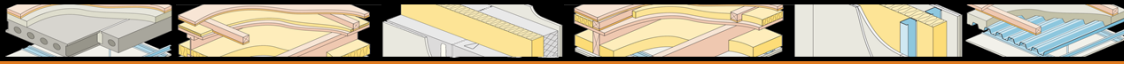
This illustration shows a raft foundation but the principles here apply just the same to transfer decks – the critical thing is that they are insitu poured at 365kg/m², which is enough to damp direct transmission.

Timber and steel have a different frequency response to concrete, so these can be mounted directly on the slab

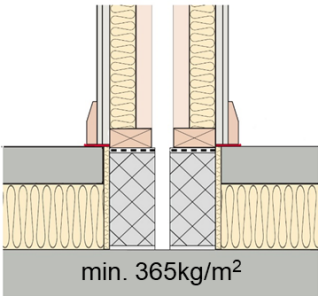
But concrete blocks have to be isolated using Bridgestop to prevent noise energy transferring from one block leaf to the other via the slab but check this applies to your chosen wall type by referring to Table 6a in the Introduction of the Robust Details Handbook, as not all walls have been approved to be used in this way.

Additional notes:

Foundations



Light frame walls on upstands



Masonry plinths can be used, but:

- Must not extend above FFL
- Must include Bridgestop (Appendix A2)

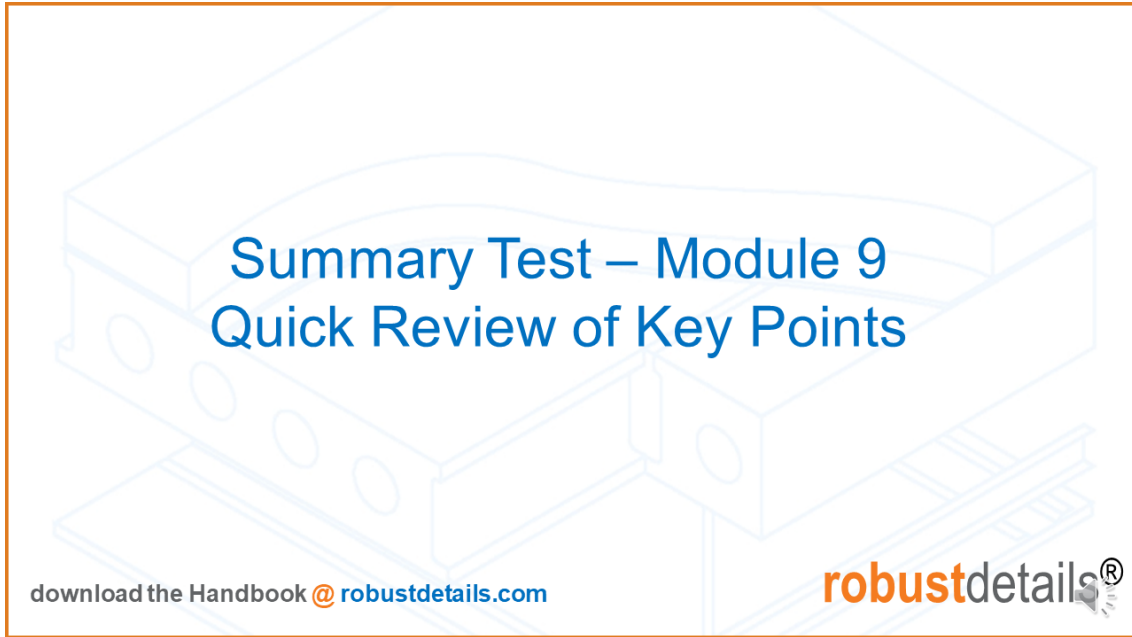
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Sometimes there may be need to raise the walls on block plinths – and this is possible, provided:
The blocks do not extend above finished floor level, so the timber-to-block junction is shielded by the floor
the Bridgestop system is used to isolate the blocks from the slab
Alternatively, upstands could be cast in as part of the slab – as long as they also stay below FFL

Additional notes:

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Summary Test – Module 9
Quick Review of Key Points

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Now for a quick TEST to recap on Module 9

Additional notes:

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Summary Test – Module 9

No.	Question
1	Wall ties will acoustically connect the wall leaves, but what 3 factors determine the amount of connection? Inherent stiffness of the tie; the cavity width; and ...
2	Why should the wall ties be kept clear of mortar droppings?
3	What would be the normal spacings for wall ties within a cavity masonry wall?
4	What feature can lead to an increased number of wall ties over a small area?
5	If the central cavity of E-WT-2 is filled with insulation that is way too thick, the insulation will be compressed - but why would this be a problem?
6	When joists are built into a cavity masonry wall, they should be sealed to the blockwork with mortar and what else?
7	What type of sound leakage can occur if the joists are not properly sealed?
8	Where separating walls are built off continuous slabs, what is the minimum weight for the slab in kg/m ² ?
9	Where cavity masonry separating walls are built off continuous slabs, what must be included at the base?
10	If masonry upstands are used to lift timber frame separating walls, where should the top of the upstand finish?

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Here are 10 questions – you may wish to PAUSE the recording and test yourself against these questions.

Once you have answered all of them – the next slide provides the answers. In 10 seconds the slide will change so press pause now if you want to test yourself first.

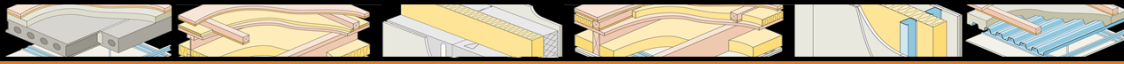
Thank you for following Module 9.

Additional notes:

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Summary Test – Answers



No.	Answer
1	The number of ties.
2	Mortar droppings can significantly increase the stiffness of the tie, allowing more sound to transfer.
3	900mm horizontally by 450mm vertically (in a staggered pattern)
4	Movement joints can have wall ties at $12.7/m^2$ instead of the normal $2.5/m^2$.
5	If the insulation is too dense, it can actually form an acoustic bridge between the two leaves.
6	Silicone sealant. This is to protect against cracking as the mortar dries out.
7	High frequency sound can creep through.
8	365 kg/m^2
9	Icopal Monarfloor BRIDGESTOP®
10	Below finished floor level, so the floor shields the potentially weak junction.

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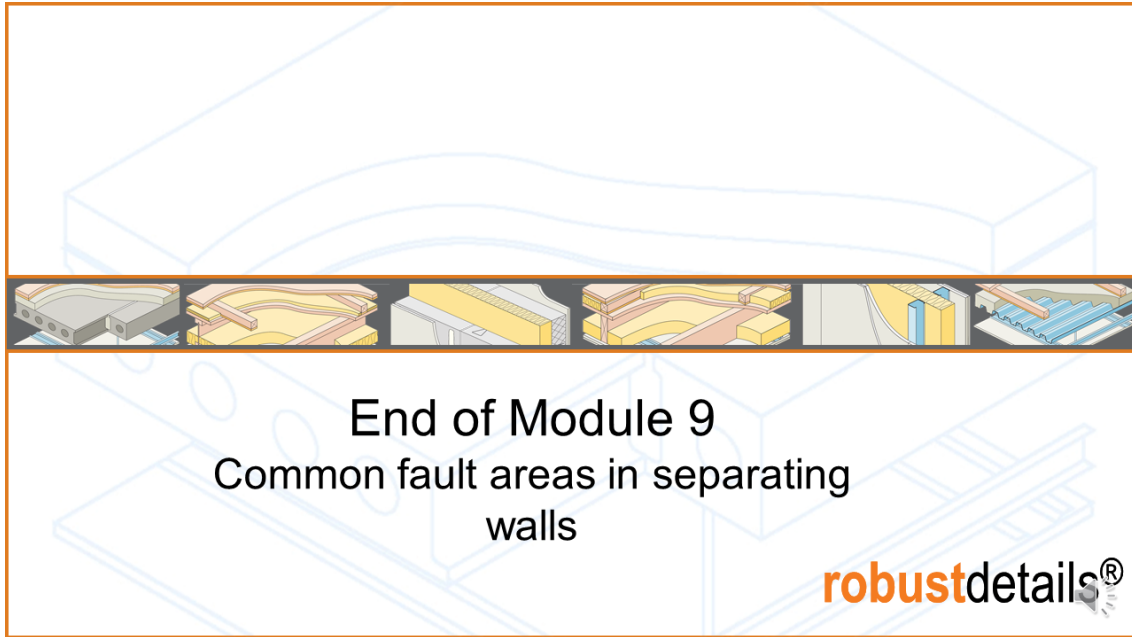
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Here are the answer to Module 9's quick test.
How did you do?

Thank you for following Module 9

Additional notes:

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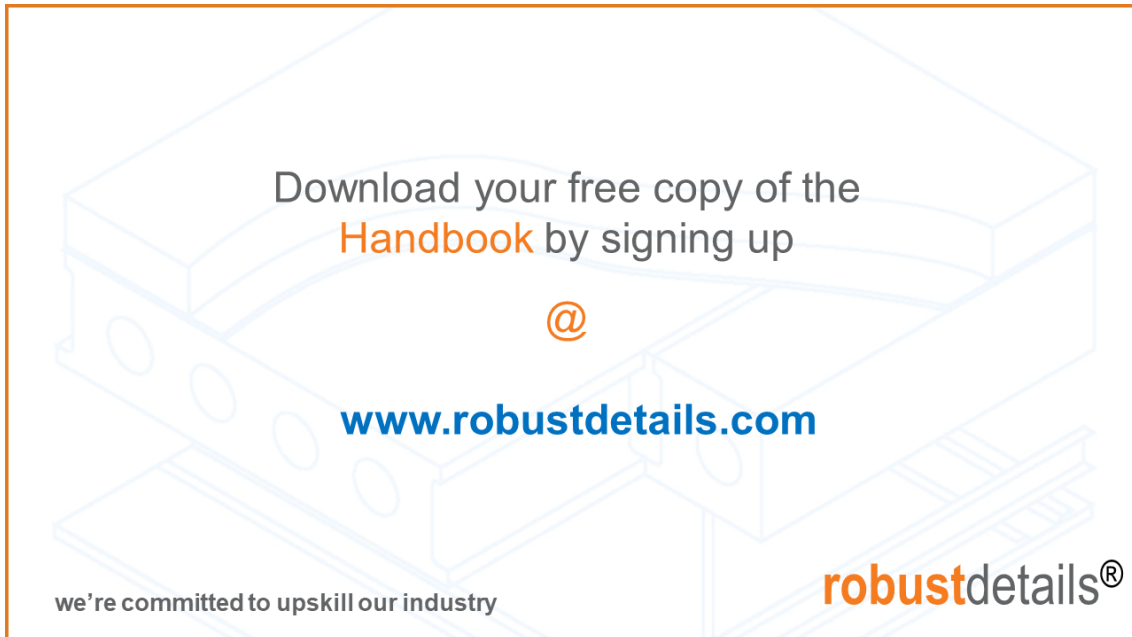


This is the end of Module 9 – Common fault areas in separating walls

Additional notes:

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Slide 24



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